vature. According to the results of Noll's recent researches it seems somewhat conclusively demonstrated that the stimulus induces an increased plastic and elastic extensibility of the longitudinal membranes of the side of the organ afterwards becoming convex through the activity of the protoplasm, that these membranes extend in length from the pressure of turgidity, which is equal throughout the entire cross section, but the membranes of the concave side are unaltered and do not respond farther to it. That the extension of the membranes of he convex sides is not growth is shown by the fact adduced by Noll that they not only become thinner during the extension but do not increase in dry weight. The alterations in the properties of the cell wall which permit the extension are accompanied by changed reactions to staining substances. The fixation of the elastically and plastically extended cell walls of a curved organ is compared to the vulcanization of a stretched membrane of india-rubber; the protoplasm produces a substance which "vulcanizes" the extended wall and prevents the reflexion of the old curvatures to the initial stature of the organ when plasmolysed.—D. T. MAC DOUGAL.

Selection of organic foods by plants.

In a recent article, Pfeffer[1] has taken up the question of selection by plants from organic foods offered. If two carbon-containing compounds, each of which is present in a quantity sufficient to completely satisfy the demand for this kind of food, be offered to a plant at the same time, will both of these substances, either of which is capable of replacing (and thus protecting) the other, be used; and if this protection takes place, to what degree does it occur?

The experiments were conducted exclusively with the lower fungi, in most cases with *Aspergillus niger* and *Penicillium glaucum*. In the first series of experiments, two carbon-containing compounds of rather unequal nutrient value, dextrose and glycerine, were added to the nutrient solution in various proportions and the fungi in pure cultures were cultivated therein. The general result was that a choice was exercised in taking up the necessary carbon-containing material. Both were somewhat used, but the better food, the dextrose,

[1] PFEFFER, W.: Ueber Election organischer Nährstoffe. Jahrb. f. wissensch. Bot. **28**: 205. 1895.

was drawn on to a far greater extent than the glycerine, the latter being thus protected. In case the dextrose was present in small quantities, it was totally consumed before the close of the experiment and the glycerine was then used until the close. Although dextrose was able to protect in great part the glycerine, still, even when present in abundance, it did not do so completely.

When lactic acid took the place of glycerine, a similar general result was reached.

In case acetic acid, in food value approximately equal to glycerine and lactic acid, was offered with dextrose, a different result was reached. Although a poorer food than dextrose, the consumption of acetic acid was large, in cases exceeding, in ratio to the quantity offered, that of the dextrose. Here, the better food did not protect the poorer from use nor did the poorer protect the better. Why acetic acid is thus consumed at the same time with the dextrose, is a question which the author does not attempt to answer. He suggests, however, that it may be of special availability for the satisfaction of some single function. The suggestion of the satisfaction of single functions does not receive full discussion but indicates interesting possibilities.

When peptone took the place of dextrose in experiments similar to the above, very similar results were obtained. On the whole, peptone protected the poorer food more completely than dextrose.

By growing fungi in a mixture of dextro- and lævo-gyrate tartaric acids very interesting results were obtained.

While Pasteur, in 1858, found the dextro-acid was used, leaving the solution lævogyrate, Pfeffer found that while a majority of the forms used in his experiments acted similarly, almost as many showed no choice, using both kinds in like quantities. One form, a bacterium, chose the left-handed acid, leaving the solution dextrogyrate.

Pfeffer considers the causes influencing selection to be largely referable to plant regulation and therefore, a function of irritability.

In case of widely differing diosmotic properties, the material penetrating more rapidly than the other, though perhaps no better food, will supply the demand to a larger degree.

The stimuli prompting to a choice arise either from the plant's own products or from the substance offered. The

quantity of reserves present and the concentration of the waste products belong to the former class of stimuli. The chemical nature, the food value of the substance and the mass offered are of the latter class.

Generally speaking, the better food is taken before the poorer, it being kept in mind that the individual peculiarities of the plant determine what constitutes a substance a good or a poor food. The extreme diversity as regards the chemical nature of substances used to supply the carbon demand is cited.

In order to speak more precisely concerning the values of materials used as food, Pfeffer introduces the "economic coefficient" of a substance for any plant in question. The "economic coefficient" of any substance for a given fungus is the amount of the dried fungus mass produced from the consumption of 100 parts of the food material.

The coefficients of dextrose and glycerine for the two kinds of fungi most used are as follows:

	Dextrose.	*Glycerine.*
Aspergillus niger	43	20
Penicillium glaucum	33	15.

RODNEY H. TRUE.

On the prevailing ombrophilous character of the foliage of tropical plants.[1]

A review of Wiesner's preliminary studies upon this subject in Europe was given in this journal in March, 1895. The present paper contains the results of his observations in Buitenzorg. It was proved, according to his previous experiments, that a distinction can be made between "ombrophobic" and "ombrophilous" foliage, and it was to be expected that this last form, the ombrophilous, would be the prevailing one in the moist tropical climate of Java.

The observations of Professor Wiesner show now, that the majority of the native and cultivated plants in Buitenzorg have ombrophilous leaves, but he observed, also, that ombrophobic leaves are not excluded. There are several plants of decidedly xerophilous character which tolerate the damp climate in this place. This is further illustrated by the fact that there is in the Buitenzorg garden a large group of Cacteæ and cactus-like Euphorbiaceæ, which thrive well in a place

[1] WIESNER, JULIUS: Pflanzenphysiol. Mittheilungen aus Buitenzorg. III: Ueber den vorherrschend ombrophilen Charakter des Laubes der Tropengewæchse. Sitzungsber. d. K. Akad. d. Wiss. math.-naturwiss. Classe **103**: 169–191. 1894.